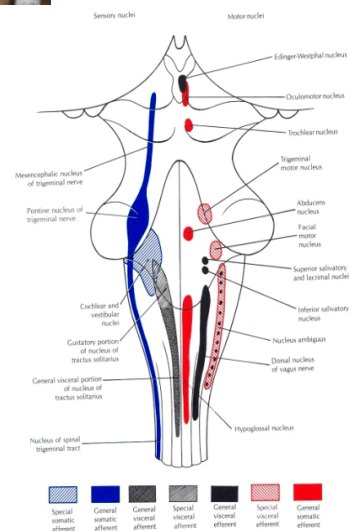
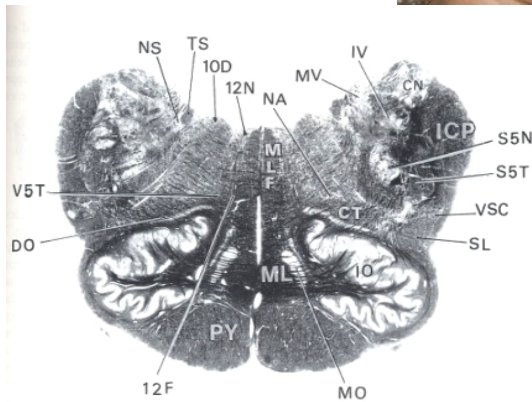


# AJK Medical College, Muzaffarabad

## Neurosciences & Behaviour Module (NEU-0113) 2<sup>nd</sup> Year



### Pre-requisite:

Renal; EMR; MFS & SPS Modules

**Duration:** 8 weeks

**Starting on:**

**DEPARTMENT OF MEDICAL EDUCATION**

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## Module Development Team

Name	Role
Prof. Dr. Sarosh Majid Salaria	Principal/Patron in Chief/Dean
Dr. Asad Bilal Arif	Module Planner/HoD Anatomy
Prof. Muhammad Ayub	Coordinator/HoD Physiology/DME
Prof. Alam Khan	Member
Dr. Ayesha Mumtaz	Member/HoD Psychiatry & Behaviour Science
Dr. Munazza	Member/Assistant Professor Medicine
Dr. Mazhar Hamdani	Member/Assistant Professor Neurology

## Introduction

The human nervous system is the most complex product of biological evolution. The constantly changing patterns of activity of its billions of interactive units represent the fundamental physical basis of every aspect of human behaviour and experience. Many thousands of scientists and clinicians around the world, whether driven by intellectual curiosity or the quest for better methods of disease prevention and treatment, have studied the nervous system over many years. Despite the enormous amount of data available, our understanding of complex neural organization and function is far from complete, as is our ability to deal with its much pathology. Nevertheless, research on the nervous system is one of the most active areas of contemporary biology and medicine and rapid advances on numerous fronts bring with them the realistic prospect of better prevention and treatment of many neurological disorders in the future.

## Module Organization

Welcome to the last module of Spiral one / 2<sup>nd</sup> year. We are beginning with neurosciences & Behaviour Module. Nervous system is a mathematical system in the sense that once you understand its structure-function relationship, it is possible to pinpoint the site the lesion. This module integrates horizontally the disciplines of Anatomy, Physiology and Biochemistry. It links with every module in the curriculum, because nervous system controls homeostasis and is essential for the survival of the human species. Vertically, it links with Paediatrics, Medicine, Neurology, Neurosurgery and Psychiatry. This module is designed to deliver the contents regarding neuroscience and behaviour in a clinical perspective. However the emphasis at this stage will be on the neuro-anatomic, Biochemical & neuro-physiological basis of neuronal pathologies; whatever you learn in this module will have significance in your future clinical practice.

The special content of neuro psychiatry and behaviour sciences has been added to the module which is upcoming new science in the world and yet unattended. The leading psychiatrist and team of behaviour sciences will take special sessions on emotional trauma, emotional balance, stress challenges and now a days right from village to the most modern society, cultural taboos leading to unknown sign and systems for the doctors. All this issues will be addressed along with head trauma, maxillofacial issues, pain and youth counselling issues.

## Teaching Strategies

The content of this module will be delivered by a combination of different teaching strategies. These include small group discussions (SGD), large Learning sessions (LLS), demonstrations in dissection hall, lab practical, general club, dissection/ skill videos and clinical skill sessions at skill lab. Entire curriculum will be delivered by clinical case scenarios each covering a theme. Read the cases and the objectives of the theme which you are supposed to encounter next day, understand and explain the case to yourself and read the relevant information. Following learning/teaching strategies will be used in NEU-0111 Module:

### Small Group Discussions (SGD)

Main bulk of the course content will be delivered in small group sessions supervised by appropriate teachers trained in the subject.

### Large Learning sessions

LLS will be employed at times to augment small groups. By and large they will be used to pass on general concepts regarding the theme. Large group instruction will be employed at times sparingly. Attend large group sessions with the following focus:

- a. Diagnose learning misconceptions.
- b. Clarify misconceptions.
- c. Standardize learning of all learners.
- d. Model questions and answers for assessment sessions.
- e. Learn concepts not well understood in SGDs.
- f. Measure your learning comprehension.

**Hands-on Activities/ Practical:** This will be in the form of dissection, spotting on pre-dissected specimens, radiology and clinical skills. Attend your scheduled lab and take advantage of free time for study. Use your labs to correlate text structures to actual specimens in lab practice.

**Skill Labs** Important clinical procedures will be taught with on hand skills by concerned specialist.

**Self Directed Learning:** A task will be given in SDL regarding the theme to be discussed on the next day. This will help to prepare you a bit before the theme is under discussion. A few SDLs (10%) have been added in between to create an environment for you to search literature as well as to deduce and synthesize information from different sources to meet the learning objectives. It will also help in breaking the monotonous / strenuous schedule and make you life-long learner.

## Assessment

In this 8-week duration module, you will have formative surprise quizzes and intermittent short tests. A full-fledged summative assessment will be conducted at the end of module. This will give you an idea about the format of the examination that you will go through at the end of the year. Of course, this will be followed by feedback on your performance in the exam. Marks obtained in the module examination will contribute 30% (internal assessment) towards end of year Professional University Examination. **There is no Resit exam for module written assessment and block IPE** under any circumstances. If you miss them, your internal

assessment will be recorded as zero. No excuse of any kind is permissible for absence in module or IPE assessment.

There will be formative assessment by senior professors of different departments or colleges to know the basic knowledge and clinical skills to know about the basic understanding of the subject and its clinical applications.

## **Table of Specifications**

1	Spinal Trauma	10%
2	Stiff Neck with Fever	10%
3	Pain/Numbness/Strokes and Rehabilitation	25%
4	Consciousness/Sleep/Memory	25%
5	Emotional balance and support	20%
6	Human being as a best creature of God	10%
	Grand Total	100%

## **Themes & Learning Outcomes**

### **I. Spinal Trauma/ Neural Tube Defects**

This theme will cover the basic anatomy and physiology of spinal cord and its related clinical correlates. It will also cover muscles of the back, posterior abdominal wall and vertebral column. Its development microscopic anatomy, functions in biochemical interactions. It will also cover the neurological deficits, pain and other sensory sensations from toe to the brain. These themes will be covered in time table according to the topics and the teachers.

### **II. Stiff Neck with Fever**

This portion will cover basic anatomy of skull, meninges and dural venous sinuses. Serbro spinal fluid and its clinical correlates, e.g., for example hydrocephalus meningitis, thrombosis. The student will be expected to perform and demonstrate lumbar punctures on manikin/SP/cadaver and give its contra-indications and indications. Interpret the report of CSF (normal and abnormal). Perform epidural block on manikin, and give its neuroanatomic basis.

### **III. Pain/ Numbness/ Strokes and Rehabilitation**

This content will cover the neuroanatomical and physiological basis of pain touch, joint position and sense, thermo-reception pain gate theory of pain transmission at spinal and central level along with its clinical correlates. Students will be expected to take history and perform clinical examination of a patient with hemiparesis. Compare and contrast the perceptions of general sensations at different levels of sensory system. Trace general sensory sensations from right great toe to primary sensory cortex.

### **IV. Consciousness/ Sleep/Memory**

This section of the course will be cover basic neuroanatomy and physiology of brainstem, reticular activating system and blood supply of the brainstem and clinical effects of vascular occlusion. Student is expected to know the role of medulla and Pons in CNS, respiration and cardio-regulation. Enlist important features of brain death? Differentiate between brain death and clinical death. Debate ethical issues related to brain death. Counsel relatives of a patient with brain death. Perform cranial nerve testing.

### **V. Emotional balance and support**

This content of the course will be cover diencphalon, limbic lobe and its connections with higher and lower cortex. It will correlate with the clinical application of knowledge for emotions, sexual and vegetative behaviour and attitude, stress management, psycho-somatic disorders and personality development and its problems.

### **VI. Human being as a best creature of the world**

This portion of the course will cover the cerebral cortex, its physiology and anatomy along with its higher and intellectual functions of the body. Its blood supply and how the lesions of the neurons effects the lower body function and CVA. It will also cover the different cortical areas involved in higher intellectual functions and will discuss the functions of Bradman areas for visual, auditory, somatic sensory, motor, and speech areas. It will also discuss the location of short-term (working) memory and long-term memory.

#### **KEY OF ICONS**



Introduction to case



For Objectives



This Icon will refer to critical questions



This Icon will refer to Lab sessions



This Icon will refer to resource material



This will refer to Keywords

## THEME 1: PATIENT WITH SPINAL TRAUMA



### CASE # 1:

Agha Muhammad Irfan, 18-year-old young man brought to emergency of AIMS, with history of fall from electric pole 8 months back. He complained of severe backache and inability to move his both legs. On examination his GCS was 15/15, BP 70/50 mmHg, pulse 64/min. No movements in both lower limbs. Sensory loss below the level of umbilicus.

On abdominal examination bladder was palpable. Patient was diagnosed as case of spinal shock. His X-ray dorsolumbar spine revealed fracture of T12. He was admitted in ward and recovered from shock after 2 days, he was having permanent paralysis of both lower limbs and loss of urinary and bowel control.

He was catheterised. His physiotherapy with bladder and bowel training was started. He stayed in ward for one month and then he was discharged on physiotherapy and weekly change of catheter. He was on regular follow up till now. Now he is having partial control of urine and have gained some sensations in the legs.

### CASE # 2:

Ehsan is a 34-year-old bus driver. While on VIP-duty assigned to transport a visiting cricket team, the bus came under attack by a terrorist group. A bullet smashed his T7 vertebra and severed his spinal cord. Before and after the surgical procedures that repaired the damage as much as possible, his legs were limp and stretch reflexes were absent. There was total sensory loss below the T10 dermatome.

His urinary bladder was catheterised, because without this the bladder distended to greater than normal size, until small amounts of urine dribbled out. Beginning at about 5 weeks after the injury, stretch reflexes began to return and bilateral Babinski signs appeared. By about 10 weeks his lower limbs were spastic. Over the same period, his detrusor began contracting forcefully at lower than normal volumes; despite this, the bladder failed to empty completely, so catheterization had to be continued.



### *At the end of the course students should be able to:-*

- Correlate the structure of components of nervous tissue to their function.
- Compare topographic anatomy of spinal cord in adult and new born.
- Localize grey and white matter in spinal cord.
- Interpret neurological presentation of spinal cord injuries at different levels.
- Describe neurulation and transformation of neural tube into central nervous system.
- State embryological basis and presentation of neural tube defects.
- Correlate the development of vertebral column to structure and function.
- Relate types of synapses to their functions.
- Explain the basis of spinal reflexes and their derangements.
- Compare the role of different neurotransmitters involved in synapses.
- Differentiate various segments of spinal cord on histological sections.
- Demonstrate organization and functional location of grey and white matter in spinal cord.
- Interpret the appearance of spinal cord and vertebral column on different neuro-imaging modalities.
- Perform motor examination of limbs.



- What is the basis of correlation between spinal cord segment and vertebrae?
- How does the structure of spinal cord reflected in its functions?
- What is the role of higher centres in spinal cord functions?
- How does grey and white matter develop?
- How do neural tube defects commonly present?
- What is the presentation of spinal shock and its basis?
- What is the basis of neurological signs seen after recovery from spinal shock?
- What is the contribution of different components of nervous tissue in overall functioning of nervous system?
- What are the activities occurring at synapse and their consequences?



<http://utdallas.edu/~kilgard/lectures.htm>, [www.youtube.com/watch?v=HgvmKT-20Q](http://www.youtube.com/watch?v=HgvmKT-20Q), [www.youtube.com/watch?v=PseUxItIw\\_Usci](http://www.youtube.com/watch?v=PseUxItIw_Usci).washington.



Neuron, synapses, grey and white matter, reflex, anomalies

## Theme 2: Patient with stiff neck & fever



A young lady with 2 kids reported Paediatrics department at AJKMC teaching Hospital with,

### **Presenting complaints of:**

High grade fever ..... 1 week

Altered level of consciousness ..... 1 day

### **History of present illness:**

According to the mother of patient she had started having fever which was high grade, intermittent with chills. She, along with fever, also had sore throat with running nose. He received medication from local GP but had not improved.

For the past one day patient developed altered sensorium. Her mother also noticed rash over his arms, neck and chest. Rest of the systemic review is unremarkable.

**Past History:** Not significant

**Social History:** The patients is student of class 1 in local school.

**Family History:** Not contributory

**GPE:** A young sick looking girl, irritable and uncooperative, was lying in bed. She has purplish rash scattered over arms, neck and chest. Temp. 104 °F, Pulse: 140/ min, B.P: 100/60 mm of Hg, RR: 26/min.

**CNS:** Patient is conscious but irritable and slightly confused.

### Signs of meningeal irritation:

Neck stiffness	+ve
Kernig's sign	+ve
Brudzinski's sign	+ve

### **Motor System:**

1. No focal neurological deficit
  2. Tendon reflexes normal
  3. Babinski's sign -ve
- Sensory System:** Difficult to assess due to patient's uncooperative behavior.

**Fundi:** Papilloedema

**Respiratory, CVS & Abdomen:** Normal

### INVESTIGATIONS:

**CBC:** TLC: 18,000/mm<sup>3</sup>, Hb: 13 g/dl, Platelets: 110,000/mm<sup>3</sup>

### **CSF Examination:**

Pressure: 300 mm of water
WBC: 20,000 (predominantly leukocytes)
Glucose: 18 mg/dl
Proteins: 350 mg/dl



**At the end of the module students should be able to:-**

1. Describe the topographic anatomy of craniospinal meninges and contained dural venous sinuses.
2. State the basis of clinical presentation of meningitis.
3. Correlate the anatomy of dural venous sinuses to the effects of their thrombosis.
4. State the principles and procedure of lumbar puncture and its uses in clinical practice.



1. Perform lumbar puncture.



2. How does dura mater perform its role?
3. What is the basis of signs and symptoms produced by dural stretch?
4. How are pia and arachnoid mater different from dura mater in structure and function?
5. Which membrane is involved in circulation of CSF and how?
6. How do dural venous sinuses differ from other venous channels?
7. Why are the connections of cavernous sinus clinically significant?
8. When will you refrain from performing lumbar puncture and why?



[www.youtube.com/watch?v=EMSknczE2gl](http://www.youtube.com/watch?v=EMSknczE2gl)



WORDS

Meninges, venous sinuses

## Case #2: A Newborn with Big Head & 'Sunset' appearance of Eyes



A male infant of 14 days was brought to AIMS with

### **Presenting complaint of:**

Unusually large head ..... Since birth

### **History of present illness:**

The grandmother of the infant noted that he had large head at birth which was increasing in size progressively.

**Past history:** The baby was delivered after a difficult and prolonged labour

**Family history:** 3 siblings (2 brothers, 1 sister), all normal.

**Social history:** Father is a tailor.

### **EXAMINATION:**

**GPE:** Weak looking baby with a disproportionately large head

Pulse: 100/min, Temp: Afebrile, R/R: 18/min

### **Head:**

1. Necrotic areas over both parietal eminences
2. Frontal and parietal prominence
3. Dilated scalp veins
4. Metopic, coronal and sagittal sutures are widely separated
5. Widely open anterior and posterior fontanelles

### **Eyes:**

1. Pushed downwards
2. Sclera visible
3. Upper half of the cornea visible

**CVS, Respiratory system, Abdomen:** Unremarkable



*At the end of the module students should be able to:-*

1. Describe formation, circulation and drainage of CSF.
2. Correlate disturbances in circulation of CSF with different sites in its pathway.
3. State effects of increased intracranial pressure and correlate them with signs and symptoms.



1. What is the difference between the composition of CSF and plasma?
2. Why CSF is essential for normal brain functioning?
3. Which system has parallels in brain to the lymphatic system of the body?
4. How blood CSF barrier is formed and why is it significant?
5. What intracranial effects are produced by elevated intracranial pressure?
6. How does elevated intracranial pressure present? What is the basis of this presentation?
7. How does hydrocephalus present in an adult?
8. Which malformations of nervous system lead to hydrocephalus?



[www.medicalvideos.me/.../10403b-cerebrospinal-fluid-neuroscience.html](http://www.medicalvideos.me/.../10403b-cerebrospinal-fluid-neuroscience.html)



WORDS Hydrocephalus, Papilloedema, Herniation

## THEME 3: A Patient with Paresthesia



### **Case# 1**

A 26 year old male presents to the emergency with a 6-day history of progressive difficulty walking, double vision, and slurred speech. He complains of a mild diffuse headache and reports paresthesias of the arms. He reports that recently experienced some cold symptoms during the preceding week. There is no history of fever, cough, chest pain, abdominal or urinary symptoms. He denies allergies or past surgery.

### **Examination:**

General Physical examination reveals a well-developed, well nourished white man in no acute distress. His vital signs include a pulse of 90 bpm, blood pressure of 150/100 mmHg, respirations of 22/min and a temperature of 37 C.

The patient's skin was warm and dry and his extremities showed no cyanosis or edema

- **Chest** - His lungs were clear upon auscultation and his heart rhythm is regular, with a normal first and second heart sound ( S1 and S2) and no third or fourth sound.
- **Abdomen** - His abdomen was soft, without tenderness or obvious mass.
- **Neurological Examination**
  - Higher Cortical Function - Altered only for slurred speech
  - Gait and Stance - Ataxic gait and a Romberg's sign drifted to the left.

- Coordination - bilateral ataxic finger to nose movement without intention tremor
- Sensory System - Distal paresthesias and mild impairment of distal position and vibration sensation in the upper extremities.
- Motor System - Normal strength and tone in lower limbs and a grade 3/5 strength in upper limbs
- Reflex - Deep tendon reflex were absent in all limbs.
- Cranial Nerves - Diplopia and paralysis of the left abducent nerve
- The patient was admitted and lumbar puncture was done for the analysis of D/RCSF.
- The CSF finding showed elevated protein and low white blood cells count. The neurologist suggest plasma pheresis with symptomatic management.

## Case #2



**Name:** Sher Ali **Age:** 45 yrs

**Occupation:** Clerk

**Presenting complaints:** Left sided weakness 12 days, Numbness of left arm and left leg ..... 12 days

### History of present illness:

According to the patient, he has developed progressive weakness on the left side of the body since 10 days. He also has developed numbness of left arm and left leg since 10 days.

**Past Medical history:** No major illness in the past.

**Family history:** His mother is a hypertensive.

**Social history:** Office clerk having a monthly income of Rs. 10,000/month. Married, supports a wife and 3 children.

**Drug history:** Not significant

### EXAMINATION:

**GPE:** A middle aged man, alert, was well oriented in person, place and time. Pulse 88/min, BP: 130/70 mmHg, Temp: Afebrile

**CNS:**

**Higher cortical functions:** Good long term memory but short term memory is reduced.

**Cranial nerves:** Intact

**Motor system:** Spastic hemi paresis and involuntary choreiform movements on the left side.

**Sensory system:**

- Reduced proprioception and postural sensibility on the left
- Application of a painful stimulus elicited a stabbing, knife-like or burning, agonising sensation
- Even light touch, such as the pressure of clothing was extremely uncomfortable

**Respiratory system, CVS and abdomen:** Unremarkable

### INVESTIGATION:

- CT scan brain



*At the end of the module students should be able to:-*

- Correlate the structure of thalamus to its functions.
- State the basis of deranged thalamic function.
- Describe different sensory modalities and their pathways.
- Interpret neurological presentation of lesions at different levels in the sensory system.



- Perform sensory system examination.



- How is thalamus related to other parts of nervous system structurally and functionally?
- What is the role of thalamic nuclei in the sensory system?
- How do connections between thalamus and cerebral cortex affect the functioning of the latter?
- How is the sensory system organized?
- How are the various sensory modalities conveyed to the cerebral cortex?
- What are the pathways for pain transmission and suppression?
- How does visceral pain differ from somatic pain?



[www.neuroanatomy.wise.edu/coursebook/thalamus.pdf](http://www.neuroanatomy.wise.edu/coursebook/thalamus.pdf)



Receptors, ascending pathways, pain.



## Theme-4: Patient with difficulty in arousal/consciousness & Articulation



**Name:** Musharraf Ali

**Sex:** Male

**Age:** 55 years

**Occupation:** Retired Brogadier

**Presenting complaints:**

Vertigo, tinnitus and unsteadiness ..... 03 days

**History of present illness:**

Patient is known hypertensive for past 12 years with irregular treatment and poor control of blood pressure. Patient was in his usual state of health 2 days ago when he developed dizziness and ringing in ears followed by difficulty in balance. Patient also complained of headache, double vision and difficulty in swallowing during the same period. His family members noticed that he has developed slurring of speech.

**Past history:** Hypertensive

**Social History:** Retired Army officer, Smoker for past 20 year (20 packs per day)

**Family History:** Father is diabetic and hypertensive

**Medication History:** Taking anti hypertensive medicine irregularly

**EXAMINATION:**

**GPE:**

Anelderly male conscious but slightly confused.

B.P: 184/115 mm of Hg, Temp: 99 °F, Pulse: 100/min, R/R: 20/min

**CNS:**

- Conscious but slightly confused.
- GCS: 15/15
- Loss of sensations of pain and temperature on right side of face
- Right Horner's syndrome (Right pupil sluggishly react to light, right sided ptosis, relative dryness of right side of face)
- Decreased gag reflex on the right
- Hoarseness
- Nystagmus on lateral gaze

**Motor system:** Motor examination of all the four limbs is normal

**Sensory system:**

- Decreased pin prick and temperature sensation on right of face
- Decreased pin prick and temperature sensation in the left limbs and trunk below the neck
- Intact light touch, vibration and joint position sense

**CVS, Respiratory system and Abdomen:** Unremarkable

**INVESTIGATIONS:**

- **CT brain:** Showed hemorrhage in territory of right posterior inferior cerebellar artery.
- **MRI brain:** Hemorrhage in right dorsolateral quadrant of medulla



***At the end of the module students should be able to:-***

- Correlate external and internal features of brain stem and its functions to different clinical presentations.
- Draw and label cross sections of brainstem at different levels
- Analyze functions of reticular activating system.
- Correlate the blood supply of brainstem to clinical effects of vascular occlusion.
- Correlate cranial nerve lesions to their pathway.
- Differentiate between brain death and clinical death.
- Debate ethical issues related to brain death.



- Perform cranial nerve testing.
- Counsel relatives of a patient with brain death.



- How does brainstem perform its role in nervous system?
- What is the basis of clinical features seen in lateral medullary syndrome?
- What is the role of lemnisci?
- What structural changes do occur during transition from cervical spinal cord to medulla oblongata?
- What is the fate of sensory and motor tracts in brainstem and their relation to clinical presentation of brainstem lesion?

- Why are features of upper motor neuron lesions of cranial nerves different from lower motor neuron lesions?
- What is common to cranial nerves IX, X and XI?
- Why is it important to know about brain death?
- What is the function of reticular activating system? How is it connected to other components of nervous system?
- How do types of sleep differ from each other?
- How does mechanism that cause sleep work?



<http://www.youtube.com/watch?v=S9FNXINLn7A>  
[www.youtube.com/watch?v=BBD7QMwZ5TO](http://www.youtube.com/watch?v=BBD7QMwZ5TO)



Brainstem, decussation, lemnisci, vascular occlusion, awareness

## **Theme 5. Patient with intention tremor and tendency to fall on one side**



### **Case #1 (Spinocerebellar Ataxia)**

A 35-year-old woman presented with progressive gait difficulties and speech difficulties since the age of 28. There was a strong family history of a similar disorder inherited in a dominant fashion. On examination, mental status and language were normal. There was mild scanning dysarthria. There was no visual loss and fundi were normal. Examination of eye movements revealed mild slowing of saccades, gaze-evoked nystagmus, and mild restriction of upgaze. There was no facial atrophy or perioral fasciculation; tongue was normal. Muscle strength, tone, and bulk were normal and there was no rigidity or tremor of any kind. Rapid alternating movements were slowed and clumsy, and there was mild finger-to-nose and considerable heel-to-shin ataxia. Deep tendon reflexes were uniformly brisk, and gait was ataxic, but the plantar responses were flexor. MRI of the brain showed pontocerebellar atrophy. Analysis of the CAG repeats in the MJD locus revealed a normal allele with 36 repeats and an expanded allele with 78 repeats.



### **Case #2**

**Name:** Rehman Chughtai      **Age:** 65yrs      **Sex:** Male      **Occupation:** Calligrapher

#### **Presenting complaints:**

Tendency to fall on the left ... 1 day      Nausea and vomiting ... 1 day

#### **History of present illness:**

The patient was alright a day ago. As usual went to work in the morning but there he developed nausea, vomiting. He became unsteady and was noticed to fall more on his left side by his colleagues. He was taken to the emergency room.

**Systemic history:** No significant complaint

**Past Medical history:** Known hypertensive for 20 yrs

**Family history:** Uncle is hypertensive

**Social history:** Belongs to middle socio-economic status

**Drug history:** On antihypertensive drugs

#### **EXAMINATION:**

**GPE:** An unsteady old man with slurred speech but well oriented in time, place and person having:

Pulse: 88/min, BP: 130/70 mmHg, Temp: Afebrile, R/R: 14/min

**CNS: Higher cortical functions:** Well oriented but with slurred speech

**Cranial nerves:** Intact

#### **Motor system:**

- Unsteady gait with tendency to fall towards the left
- Finger-finger test, finger nose test: Misses his mark
- Heel knee test: Unable to perform smoothly
- Inability to perform rapidly alternating supination and pronation
- Pendulous knee jerk

**Respiratory System, GIT and CVS:** Unremarkable



**At the end of the module students should be able to:-**

- Correlate structure of cerebellum on specimen and model to imaging (CT/MRI).
- Correlate microstructure of cerebellum to function.
- Correlate functional anatomy of cerebellum to various clinical presentations in cerebellar diseases.



- Perform clinical examination of cerebellar functions.
- Identify histological structure of cerebellum on slides.



- How do you anatomical divisions of cerebellum correlate with functional division?
- How does cerebellum receive its input and from where?
- How does cerebellum affect motor activities?
- What is the basis of signs seen in cerebellar disorders?
- Why this patient falls on one side of the body?
- How is balance maintained?
- How cerebellum performs inhibitory functions?



<http://utdallas.edu/~kilgard/lectures.htm>, [http://www.medicalvideos.me/2011/09/0406c-cerebellar-pathways\\_neuro\\_science.html](http://www.medicalvideos.me/2011/09/0406c-cerebellar-pathways_neuro_science.html)



Equilibrium, co-ordination

### **THEME 6: Young Girl Obsessed With Figure& Thirst**



A young female student of 22 year reported Medical OPT in AIMS with following Presenting complaint:  
Weight loss for past few months (as stated by the mother)

History of present illness:

A worried mother brought her daughter who was loosing weight visibly. Since one year she has become a very choosy eater. She was also scared of meeting strangers. She had become impatient, irritable and cried a lot. She contended that she was too fat and must diet to maintain her figure. She is cold intolerant and constipated most of the time and is having amenorrhoea for last three months.

**Past Medical history:** Has been a chubby child throughout her school life and has been advised by her friends to loose weight. She has started using various weight loss strategies, without proper guidance, from the beginning of her teenage.

**Family history:** 2 siblings (1 sister, one brother) all fit and smart

**Social history:** Mother is a celebrity and father, a business executive

**Drug history:** Various weight losing prescriptions

#### **EXAMINATION:**

**GPE:**

- Anxious looking pale, thin girl with sunken eyes
- Prominent cheek bones and clavicles
- Dry, scaly skin
- Increased lanugo hair
- Bilateral parotid enlargement
- Cold extremities
- Mild pedal oedema

Pulse: 56/min, BP: 85/60 mm of Hg,

Temp: Afebrile, R/R: 18/min

**CNS: Higher cortical functions:** Intact

**Cranial nerves:** Intact

**Motor system:** Intact

**Sensory system:** Intact

**CVS, respiratory system and abdomen:** Unremarkable

#### **INVESTIGATIONS:**

**CBC:** Hb: 10 mg/dl; WBC: 9,000/mm<sup>3</sup>; Platelet count: 125,000/mm<sup>3</sup>

**TSH:** 6.5 μIU/ml (Reference range: 0.4-3.5 ~ Up to 18 yrs)

**FSH:** Decreased

**Estradiol:** Decreased

**LH:** Decreased



**At the end of the module students should be able to:-**

- Correlate the structure of hypothalamus to its functions.
- Relate the role of hypothalamo-hypophyseal portal system to its structure.
- Associate clinical presentation of hypothalamic disorders to respective nuclei.



- How does autonomic nervous system compare with the somatic nervous system in its organization?
- Why in above case symptoms occur after pneumonectomy?
- During exercise why blood flow to the muscles increase when at this same time blood flow to GIT and urinary system is decreased?

- What is the autonomic control of bladder?
- What is fight-flight response?
- What is the difference between the metabolic effects of epinephrine and norepinephrine?
- What is the basis of ptosis and pupillary constriction in Horner's syndrome?
- Describe structural and functional organization of ANS.
- Relate the mode of action of sympathetic neurotransmitters to their effects on target organs.
- Relate the mode of action of parasympathetic neurotransmitters to regulation of body functions.
- Identify the drug groups modulating the functions of ANS.
- How is hypothalamus connected to pituitary?
- What is the role of hypothalamus in maintaining circadian rhythm?
- Which autonomic activities are controlled by hypothalamus?
- How do vegetative and endocrine functions of hypothalamus play their role in limbic system?



[www.meddean.hec.edu/lumen/MedEd/neuro/week6.pdf](http://www.meddean.hec.edu/lumen/MedEd/neuro/week6.pdf), [academicearth.org/lectures/nervoussystem\\_4](http://academicearth.org/lectures/nervoussystem_4)  
[www.videolectures.net/mit7012f04-lander-lec26](http://www.videolectures.net/mit7012f04-lander-lec26)



**WORDS** Hypothalamo-hypophyseal connection, circadian rhythm, satiety, 'fight-or-flight', ganglia, neurotransmitters

## Theme# 7: A Patient with Involuntary Jerky Movements



### Case#1

A 32-year-old male Caucasian, who was lively and talkative as a child, completed high school with As and Bs and four years of college with poor grades. At age 22 he became quiet and non-conversant. At age 24 he began work as a cook/dishwasher and displayed noticeable uncoordination. At age 28 he developed dysarthria, dysphagia, stiffness, slow ataxic gait, and dementia. There was no history of schizophrenia or depression and the neurological review of systems was negative. Both parents were in their late 60s and in excellent health, without signs of dementia. There was no family history of any neurodegenerative disease, and he had three sisters, ages 35-37, all in good health.

Laboratory results showed normal CPK, vitamin E, lactate, and pyruvate levels. The patient's MRI revealed a generalized, cerebral and cerebellar atrophy and a very small caudate nuclei. Two skin biopsies showed normal mitochondria on histology. Bone marrow analysis and enzyme screens for Gm, HGM, MLD, and Krabbe's disease were all normal. During the physical exam the patient scored a 20/26 on the mini-mental status exam. The cranial nerve exam was remarkable for decreased upgaze, saccadic extraocular eye movements, dysarthria and hyperactive gag reflex. There was increased tone in all extremities with normal strength and gait was wide-based and ataxic.

A Huntington's Disease DNA test was ordered; the patient's PCR analysis demonstrated two bands, one normal band at 23 CAG repeats and an abnormal band of 49 CAG repeats. A diagnosis of HD was made. The patient's parents were also tested. His father showed a normal band of 20 CAG repeats and a band within the borderline range of 37 CAG repeats. One sister received a predictive test that was found to be negative.

### Case#2: Patient With Resting Tremor, Shuffling Gait



**A senior person of 63 years age who was Railway Officer reported Neurophysian with the following Presenting complaints:**

- Difficulty in initiating movements
- Tremors involving whole body

#### **History of present illness:**

Patient was well 10 years ago when he noticed some slowness and difficulty in using his right arm. He also had occasional shaking of right arm and leg. The tremors spread to involve his entire body and his movements became progressively slower and stiffer. He often had difficulty in initiating movements.

**Past history:** Hypertensive for 10 years, taking drugs irregularly

**Family history:** 3 sons and 2 daughters, all are healthy and married

**Social history:** Belongs to lower middle social class

#### **EXAMINATION:**

**GPE:** An old man with mask-like face, well oriented and alert with slightly hypophonic voice.

**B.P:** 130/80mmHg, **Pulse:** 90/min, **Temp:** Afebrile, **R/R:** 18/min

**Head:** Tremors of the head

**CNS:**

**Higher cortical functions:** Conscious, active

**Cranial nerves:** Intact

**Sensory system:** Touch, pressure, vibration, two point discrimination, pain and temperature sensations are intact.

**Motor system:**

- Tremors of all extremities, worse on right side especially at rest. “Cogwheel” rigidity of the right arm
- Both hands showed fingers tapping and rapid alternating movements
- Muscle power was 5/5 throughout
- Slow stiff gait with stooped posture, short steps and decreased arm swing
- Exhibited retropulsion of two steps when pulled gently backwards

**CVS, Respiratory system, Abdomen:** Unremarkable



**At the end of the module students should be able to:-**

- Localize the various Anatomical & clinical basal ganglia.
- Identify the basal nuclei on images.
- Correlate the connections of basal nuclei to their functions.
- Describe extra-pyramidal pathways.
- Relate basis of disorders associated with basal nuclei.
- Describe the synthesis, functions and degradation of various neurotransmitters involved in functioning of basal nuclei.
- Identify drugs modulating the functions of neurotransmitters in basal nuclei.



- What is the function of neuronal circuitry of the basal nuclei?
- What clinical syndrome results from the damage to basal nuclei?
- What is the basis of the features of this condition?
- How do various neurotransmitters affect the functioning of basal nuclei?



<http://utdallas.edu/~kilgard/lectures.htm>, [videlectures.net/mitworld-basalganglia-symposium/09](http://videlectures.net/mitworld-basalganglia-symposium/09)



Poker face, Cogwheel rigidity, circuitry

## **Theme 8. Patient with Stroke**



### **CASE#1**

A 67-year-old man was taken to see his physician by his wife. For the preceding 2 days, the patient’s wife had noticed that he did not seem to make sense when he spoke. She also indicated that he seemed a little disoriented and did not respond appropriately to her questions. He has no obvious motor or somatic sensory deficits.

On examination, the physician concludes that the man had a stroke in a region of one of his cerebral hemispheres. As part of the diagnosis, the physician tests the man’s visual fields and notices a decreased awareness of stimuli presented to one visual field.

**Case # 2:** A 50-year-old man comes for evaluation of persistent difficulty in using his right arm and leg. The patient was well until one month previously when he had abrupt onset of weakness on the right side of his body while watching a television show. He was taken to the hospital by ambulance within one hour of onset of symptoms. The initial evaluation in the hospital emergency department shows elevated blood pressure with values of 200 mm Hg systolic and 150 mm Hg diastolic. The right arm and leg are severely weak. Activity of the myotatic reflexes on the right side is very reduced in comparison with the left side, where they are normal. Right side limb movements are slightly improved by 12 hours after onset, but are still moderately impaired on the fourth hospital day.

A magnetic resonance imaging study (MRI) of the brain performed on the second day of hospitalization shows a stroke involving the left cerebral hemisphere in the region of the internal capsule. The blood pressure remains elevated, and medication to lower it is begun during the hospital stay. The patient is transferred to a rehabilitation hospital on the fourth day for extensive physical therapy to assist further recovery of neurological function.

At follow-up examination one month after onset of the stroke, the blood pressure remains normal on the medication that was started in the hospital. Neurological examination demonstrates mild weakness of the right arm and leg. There is still a slight but obvious delay between asking the patient to move those limbs and the movement actually beginning. Passive movement of the right arm and leg by the physician provokes involuntary contraction of the muscles in those limbs that seem to counteract the attempted movement. Right side myotatic reflexes are very hyperactive compared with those obtained on the left. When the skin over the lateral plantar area of the right foot is stroked, the first toe extends involuntarily. When this maneuver is performed on the left, the toes flex.

### **CASE #3**

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**Name:** Waheed Mian

**Age:** 63 years

**Sex:** Male

**Presenting complaints:** Inability to move right side of his body ...1 hr  
Difficulty in speech ...1hr

**Occupation:** Businessman

**Marital status:** Married

**History of present illness:**

According to his wife, they were returning home late night in their car when she noticed sudden slumping over of her husband was looking confused and making grunting sounds. There was no complete loss of consciousness but he was unable to move right side of his body and unable to speak properly.

**Past history:** Hypertensive for 10 years taking drugs irregularly

**Family history:** 3 sons and 2 daughters all are healthy and married.

**Social history:** Businessman belongs to high social status.

**EXAMINATION:**

**GPE:** An old man in suit looking confused and tendency to fall on right side.

B.P: 170/100mmHg, Pulse: 90/min, Temp: Afebrile, R/R: 18/min

**CNS: Higher cortical functions:**

**Cranial nerves:** Lower face paralysis, unable to see from his left eye

**Sensory system:** Loss of touch, pressure, vibration, two point discrimination, pain and temperature on right side of the body except face

**Motor system:** Complete paralysis of right sided upper and lower limbs with loss of muscle tone, loss of tendon reflexes, 0/5 power and up-going plantars

**CVS, Respiratory system, Abdomen:** Unremarkable



*At the end of the module students should be able to:-*

- Reflect on comparative functional anatomy of mammalian brain.
- Describe the topographic anatomy of cerebrum.
- Correlate microstructure of cerebrum to its functions.
- Associate sulci and gyri with cortical functions.
- Identify various sulci, gyri and cortical areas on the specimen/model/imaging modalities.
- Identify various fiber bundles in the cerebrum.
- State the functional losses associated with the lesions of fiber bundles in cerebrum.
- Describe pyramidal pathways.
- Interpret the effects of lesions of pyramidal pathway at different levels.
- Differentiate between upper and lower motor neuron lesions on the basis of functional anatomy.
- Correlate the effects of cerebral vascular occlusion to clinical presentations.



- Perform the motor system examination.



- How is the knowledge of sulci and gyri useful for understanding cerebral function?
- How do different areas of cerebral cortex integrate with each other?
- What functions are performed by frontal lobe?
- Which areas of cerebral cortex are affected by occlusion of middle cerebral artery? What would be outcome?
- How is cerebral dominance determined?
- What functions are exclusive to each hemisphere?
- How does cerebral cortex participate in motor activities?
- How does the cerebral hemisphere coordinate in production of meaningful speech?
- Where do collaterals from corticospinal tract go? What is their significance?
- What is the role of corpus callosum in normal functioning of brain?
- Which side of the brain most likely suffered the stroke?
- Which regions of the hemisphere suffered the stroke?
- What information from the case history gives the answers to these questions?

Which visual field is affected by the stroke?



<http://utdallas.edu/~kilgard/lectures.htm>

[www.youtube.com/watch?v=BBD7QMwZ5TO](http://www.youtube.com/watch?v=BBD7QMwZ5TO)



Hemiplegia, speech deficit, cortical neglect, motor contro

## Theme# 9: A Patient with Recent Memory Problem

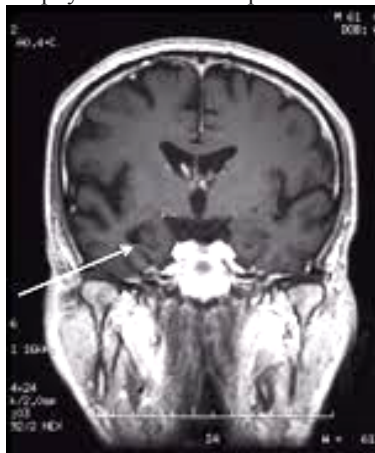


A 76-year-old Rasheeda Faiz is brought to AIMS OPD by her Brother because she is becoming more forgetful. She is living alone after the death of her husband and have no children .So far she is managing very good. She used to collect her husband pension independently but has recently received call from post office that she didn't collected pension for last 3 months . she enjoyed cooking but now she found it difficult to prepare a balanced meal. She has lost 3.5 kg in the past 3 months, and left the water running in her bathtub and flooded the bathroom. When her Brothers express their concerns, she becomes irritable and resists their help. Her house has become more cluttered and unkempt. On a past visit to her physician, she had normal laboratory tests for metabolic, haematological, and thyroid function. The current evaluation reveals no depressive symptoms and 2/15 on the Geriatric Depression Scale short-form.

Her Mini-Mental State Examination (MMSE) score is 20/30.

Her Routine laboratory investigations shows :

- FBC: Normal
- Basic metabolic panel including liver function tests (LFTs) and serum calcium: Normal
- ESR: Normal range
- Thyroid-stimulating hormone (TSH): Normal
- Vitamin B12: Normal level
- Urine drug screen: Negative
- Serological testing for syphilis (VDRL): Negative
- CT SCAN BRAIN: Normal study
- MRI BRAIN: Generalized atrophy with medial temporal lobe and later parietal predominance



Her diagnosis was made as Alzheimer disease, slowly progressive neurodegenerative process.

### Case#2 Patient out of Touch with Reality



**Name:** Kamal Keyani **Age:** 75-years **Sex:** Male **Occupation:** Businessman

**Presenting complaint:** Progressive memory loss (as stated by son)

**History of present illness:** The patient was brought to neurology clinic for consultation by his son because of several weeks of severe progressive memory problems. At baseline, the patient had normal cognition, exercised avidly and maintained an active schedule, trying to keep appointments with friends and business associates. Ten days prior to admission he met a friend for lunch in a club and had a normal, clear precise conversation except that he did not remember the name of the waiter he had known for several years. Four days later, the same friend spoke to Kamran on phone and discovered that he had no recollection of having lunch or of day of their conversation. He seemed normal otherwise. The next day, he missed important business meetings. When his son talked to him over subsequent days his conversation seemed appropriate except he was totally unaware of current events, including a recent cricket match.

**Past history:**

- Controlled hypertensive
- No history of Diabetes or alcoholism

**Family history:** 3 siblings (2 brothers, 1 sister) all normal

**Social history:** A semi retired rich businessman

**EXAMINATION:**

**GPE:** A healthy looking old aged man completely relaxed

Pulse: 74/min, Temp: Afebrile, R/R: 18/min

**CNS:**

**Higher cortical functions:**

- Conscious, active, cooperative

- Disoriented in person, place and time
- Remote memory is intact
- Inability to recall recent events
- Mild tendency to confabulate

**Cranial nerves:** Intact

**Sensory system:** Intact

**Motor system:** Intact

**CVS, Respiratory system, Abdomen:** Unremarkable



**At the end of the module students should be able to:-**

- Describe the topographic anatomy of limbic lobe of brain.
- Describe the functions of limbic system and disturbances of behavior.
- Describe mechanism of cognition, memory traces, assimilation, retrieval and application.
- Describe disturbances of memory.



- What is a limbic circuit?
- What is the role of limbic system in memory and emotions?
- What do you think is the role of thalamus in memory?
- Differentiate between retrograde and anterograde amnesia.
- Why we are able to memorize things?
- Why we don't remember most of the things after many days have passed?
- What is the role of neurotransmitters in memory?
- What happens in case of lesion to hippocampus?
- What is declarative memory?



<http://utdallas.edu/~kilgard/lectures.htm>

[video.google.com/videoplay?docid=10712762284770838773](https://www.youtube.com/watch?v=10712762284770838773)



**WORDS** Memory, hippocampus, amnesia, emotions, behavior, drive

### List of PBLs

- | # | PBL   |
|---|---|
| 1 | Spinal Trauma.  |
| 2 | A patient with fever & Headache.                                    |
| 3 | A patient with dysphagia, dysarthria & hemiparesis/ hemianesthesia. |
| 4 | A patient with nystagmus & hemiparesis.                             |
| 5 | A patient with ataxia & intention tremors                           |
| 6 | A patient with Stroke   |
| 7 | Student failed in first professional MBBS of University Examination |

### RECOMMENDED TEXT BOOKS

1. Clinical Neuroanatomy-Patrick Snell
2. Textbook of Medical Physiology- Guyton and Hall
3. The Developing Human- Moore and Persaud
4. Junqueira's Basic Histology.
5. Gray's Anatomy
6. Illustrated Neuroanatomy by Tassaduq Hussain Sheikh
7. Human Embryology by Laiq Hussain Siddiqui

### **Additional Reading**

1. Barr's The Human Nervous System
2. Review of Medical Physiology- Ganong.
3. Visit LRC library and use internet facility to get latest knowledge on the subject.

### **PBL-2A**

A Five year old kid reported in Paediatrics department at AJKMC teaching Hospital with, Presenting complaints of High grade fever from last 1 week and Altered level of consciousness from 1 day According to the mother of patient she had started having fever which was high grade, intermittent with chills. She, along with fever, also had sore throat with running nose. He received medication from local GP but had not improved. For the past one day patient developed altered sensorium. Her mother also noticed rash over his arms, neck and chest. Rest of the systemic review is unremarkable.



**On examination,** A young sick looking girl, irritable and uncooperative, was lying in bed. She has purplish rash scattered over arms, neck and chest. Temp. 104 °F, Pulse: 140/ min, B.P: 100/60 mm of Hg, RR: 26/min.

**CNS:** Patient is conscious but irritable and slightly confused. Her Neck stiffness, Kernig's sign and Brudzinski's sign were +ve with No focal neurological deficit. Tendon reflexes normal and Babinski's sign -ve  
Sensory System was Difficult to assess due to patient's uncooperative behaviour. Fundoscopy revealed Papilloedema

4. Respiratory, CVS & Abdomen was unremarkable

5. **INVESTIGATIONS:**

6. **CBC:** TLC: 18,000/mm<sup>3</sup>, Hb: 13 g/dl, Platelets: 110,000/mm<sup>3</sup>

7. **CSF Examination:**

8. Pressure: 300 mm of water

9. WBC: 20,000 (predominantly leukocytes)

10. Glucose: 18 mg/dl

11. Proteins: 350 mg/dl

# AJK Medical College, Muzaffarabad

## Neuroscience & Behaviour Module-2<sup>nd</sup> Year

### Week-1

	Monday	Tuesday	Wednesday	Thursday	Friday
8-9 AM	<b>Module Assessment SPS</b>	<b>LGIS</b> Classification of receptors <b>Prof. M. Ayub</b>	<b>LGIS</b> Neuro transmitters <b>Dr Zahid Azeem</b>	<b>LGIS</b> Formation of spinal nerve <b>Prof. Ghuncha</b>	<b>Islamic Studies</b> <b>Prof. Ayub</b>
9-10 AM		<b>LGIS</b> Topographic Anatomy of brain <b>Prof. Ghuncha</b>	<b>DSL</b> Formation & functions of CSF	<b>LGIS</b> cranial nerve <b>Prof. Ghuncha</b>	<b>Pak. Studies</b> <b>Prof. Ghuncha</b>
<b>Break</b>					
10:30-12:30	<b>LGIS</b> Introduction to Neurosciences Module <b>Prof. Ghuncha &amp; Module Team</b>	<b>PBL-1A</b> <b>Prof. Ghuncha &amp; Team-1</b>	<b>SGD</b> General Neuro Anatomy; classification of neurons <b>Team-1</b>	<b>SGD</b> Functions of the cranial nerve <b>Team-2</b>	<b>PBL-1B</b> <b>Prof. Ghuncha &amp; Team-1</b>
12:30-1:30	<b>DSL</b> Structure of Neuron	<b>DSL</b> Difference between myelinated and unmyelinated nerve fibres	<b>LGIS</b> Topographic Anatomy of Spinal Cord <b>Prof. Ghuncha</b>	<b>DSL</b> Organization of sympathetic and parasympathetic NS	
<b>Prayer Break</b>					
2-4 PM	<b>SGD</b> General Neuro Anatomy; diffused endocrine system <b>Team-1</b>	<b>SGD</b> General Neuro Anatomy; classification of nerves system <b>Team-1</b>	<b>Dissection</b> Muscles of the back-I <b>Team-1</b>	<b>Dissection</b> Muscles of the back-II <b>Team-1</b>	<b>DSL</b>

# AJK Medical College, Muzaffarabad

Neuroscience & Behaviour Module – 2<sup>nd</sup> Year

Week-2

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b><u>PBL-2A</u></b> <b><u>Dr. Sarmad &amp; Team-1</u></b>	<b><u>LGIS</u></b> Neuropeptides <b>Prof. Alam Khan</b>	<b><u>LGIS</u></b> Introduction to Autonomic Nerves system <b>Prof. Ghuncha / Dr. Liaqat</b>	<b><u>LGIS</u></b> Function of Cranial Nerves <b>Dr. Mazhar Hamdani</b>	<b>Islamic Studies</b>
			<b><u>LGIS</u></b> Spinal and Local Anaesthesia <b>Brig [R] Prof Dr Ihsan ul Haq</b>	<b><u>LGIS</u></b> Physiological Properties of Neurons <b>Prof. Ayub</b>	<b>Pak. Studies</b>
<b>Break</b>					
10.30 – 12.30	<b><u>LGIS</u></b> Formation of spinal and cranial nerve <b>Prof. Ghuncha</b>	<b><u>SGD</u></b> General Neuro physiology; functions of the cranial nerve-2 <b>Team-2</b>	<b><u>SGD</u></b> Synapses <b>Team-2</b> <b>Wrap up</b> <b>Dr. Ijaz Anwar</b>	<b><u>LGIS</u></b> Ascending tracts <b>Dr. Ijaz Anwar</b>	<b><u>PBL-2B</u></b> <b><u>Dr. Sarmad &amp; Team-1</u></b>
12:30 – 1:30	<b><u>SGD</u></b> Classification of Neuron <b>Team-1</b>		<b><u>DSL</u></b> Special characteristics of sympatric transmission		
<b>Prayer Break</b>					
2-4 PM	<b><u>Dissection</u></b> Muscles of the back <b>Team-1</b>	<b><u>Dissection</u></b> Muscles of the back <b>Team-1</b>	<b><u>Dissection</u></b> Paravertibral Gutter -1 <b>Team-1</b>	<b><u>Dissection</u></b> Paravertibral Gutter -2 <b>Team-1</b>	<b>SDL</b>

# AJK Medical College, Muzaffarabad

Neuroscience & Behaviour Module – 2<sup>nd</sup> Year

Week-3

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b><u>Practical</u></b> <b>Histo Lab:</b> Cranial Nerve 1,3,4,6,& 11 (1-50) <b>Physiology Lab</b> = Histology of Brainstem 51-100 <b>Team-1</b>	<b><u>Practical</u></b> <b>Histo Lab:</b> Cranial Nerve 1,3,4,6,& 11 (1-50) <b>Physiology</b> <b>Lab =</b> cranial nerves I, III, IV51-100 <b>Team-1</b>	<b>LGIS</b> Backache <b>Maj. Omer</b> <b>Jamshad</b>	<b>LGIS</b> Organization of Motor Cortex <b>Prof. Ghuncha</b>	<b>Islamic Studies</b>
				<b>LGIS</b> Descending tracts <b>Dr. Ijaz Anwar</b>	<b>Pak. Studies</b>
			<b>Break</b>		
10.30 – 12.30	<b>SGD</b> Sensory cortex and Boardman's classification <b>Team-2</b> <b>Wrap up</b> <b>Dr. Ijaz Anwar</b>	<b>LGIS</b> Functional components of Spinal Nerves <b>Dr. Ijaz</b> <b>Anwar</b>	<b>SGD</b> Cranial Nerve Nuclei and their lesions <b>Team-2</b> <b>Wrap up</b> <b>Dr. Fauzia</b>	<b>Skil Lab</b> Cranial Nerve Examination 11,5,7,8,9,10  <b>Dr. Ali Arshad,</b> <b>Dr. Liaqat Awan</b> <b>Dr. Munazza</b>	<b>Skill Lab</b> Superficial and deep tender reflexes <b>Dr. Ali</b> <b>Arshad &amp;</b> <b>Team-2</b>
		<b>LGIS</b> Ascending Sensory system in Brainstem <b>Dr. Fuzia</b>			
12.30	<b>DSL</b> Speech centre and speech	<b><u>DSL</u></b> Brown squared Syndrome			
	<b>Prayer Break</b>				
2-4 PM	<b><u>Dissection</u></b> Spinal Cord-1 <b>Team-1</b>	<b><u>Dissection</u></b> Spinal Cord -2 <b>Team-1</b>	<b><u>Dissection</u></b> Brainstem -1 <b>Team-1</b>	<b><u>Dissection</u></b> Brainstem -2 <b>Team-1</b>	<b>DSL</b> Regeneration of Severed Nerve

# AJK Medical College, Muzaffarabad

## Neuroscience& Behaviour Module - (2<sup>nd</sup> Year)

### Week-4

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b><u>LGIS</u></b> Physiology of Pain <b>Dr. Ijaz Anwar</b>	<b><u>Practical</u></b> <b>Histo lab:</b> spinal cord & medulla oblongata (1-50) <b>Team-1</b>	<b><u>Practical</u></b> <b>Histo lab:</b> spinal cord & medulla oblongata (50-100) <b>Team-1</b>	<b><u>LGIS</u></b> Reticular Formation <b>Dr. Fauzia</b>	<b>Islamic Studies</b>
	<b><u>LGIS</u></b> Analgesia system <b>Dr. Ijaz Anwar</b>	<b>Physiology lab:</b> Tendon Reflexes (50-100) <b>Team-2</b>	<b>Physiology lab:</b> Tendon Reflexes (1-50) <b>Team-2</b>	<b><u>LGIS</u></b> Connections of Cerebellum <b>Dr. Fauzia</b>	<b>Pak. Studies</b>
<b>Break</b>					
10.30 – 12:30	<b>SGD</b> Medulla oblongata <b>Dr. Alina &amp; Team-1</b>	<b><u>Dissection</u></b> Pons <b>Team-1</b>	<b><u>LGIS</u></b> Management of Pain <b>Maj. Omer Jamshad</b>	<b>SGD</b> functions of cerebellum <b>Team-2</b> <b>Wrap-up</b> <b>Dr. Ijaz Anwar</b>	<b>SGD</b> Functions of basal ganglia <b>Dr. Fauzia &amp; Team-2</b>
	<b>Wrap-up</b> <b>Dr. Sarmad</b>	<b>DSL</b> Pain	<b><u>DSL</u></b> <u>Equilibrium</u>	<b>DSL</b> Cerebolar lesions	<b>Wrap-up</b> <b>Dr. Fauzia</b>
<b>Prayer Break</b>					
1.30-4PM	<b><u>Dissection</u></b> Medulla oblongata <b>Team-1</b>	<b><u>Dissection</u></b> Midbrain <b>Team-1</b>	<b><u>Dissection</u></b> Cerebellum <b>Team-1</b>	<b>SGD</b> Muscle Sensory Receptor <b>Team-2</b> <b><u>Wrap-up</u></b> <b>Dr. Fauzia</b>	<b>DSL</b> Cerebral Hemisphere

# AJK Medical College, Muzaffarabad

Amended Schedule of 2<sup>nd</sup> Year

Week-5

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM			<p><b><u>LGIS</u></b> Arabic Language &amp; Islamic Studies By <b>Prof. Anwar</b> (1<sup>st</sup> &amp; 2<sup>nd</sup> Year) at Auditorium</p>		<p><b><u>Practical</u></b> <b>Histo lab:</b> spinal cord &amp; medulla oblongata (50-100) <b>Team-1</b> <b>Physiology lab:</b> Tendon Reflexes (1-50) <b>Team-2</b></p> <p><b><u>LGIS</u></b> Pakistan Studies <b>Dr. Zahid Azeem</b> (1<sup>st</sup> &amp; 2<sup>nd</sup> Year) at Auditorium</p>
	<b>Break</b>				
10:30– 12:30			<p><b><u>LGIS</u></b> Management of Pain  <b>Maj. Omer Jamshad</b></p>		<p><b>SGD</b> Functions of basal ganglia <b>Dr. Fauzia &amp; Team-2</b></p>
			<p><b><u>DSL</u></b> <b>Equilibrium</b></p>		<p><b>Wrap-up</b> <b>Dr. Fauzia</b></p>
	<b>Prayer Break</b>				
1.30-4PM			<p><b><u>Dissection</u></b> Cerebellum <b>Team-1</b></p>		<p><b>DSL</b> Cerebral Hemisphere</p>

# AJK Medical College, Muzaffarabad

Amended Schedule of 2<sup>nd</sup> Year

Week-4

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b>Eid Holiday</b>	<b>Eid Holiday</b>	<b>Eid Holiday</b>	<b>Revision</b> Sensory Pathway and its lesions <b>Team-1</b>	<b>Revision</b> Functions of cerebellum <b>Team-1</b>
	<b>Tea Break</b>				
10:30– 12:30	<b>Eid Holiday</b>	<b>Eid Holiday</b>	<b>Eid Holiday</b>	<b>Revision</b> Brain Stem <b>Team-1</b>	<b>Revision</b> CFS and its drainage <b>Team-1</b>
	<b>Lunch &amp; Prayer Break</b>				
2-4PM	<b>Eid Holiday</b>	<b>Eid Holiday</b>	<b>Eid Holiday</b>	<b>Revision</b> Motor Pathways and all lesions <b>Team-1</b>	<b>DSL</b> cerebellum

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Week-5

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b>SGD</b> Function & connections of diencephalon <b>Team-2</b> <b>Wrap-up</b> <b>Dr. Ijaz Anwar</b>	<b>Practical</b> <b>Histo lab:</b> cerebellum (1-50) <b>Team-1</b> <b>Physio lab:</b> cerebellar Functions (51-100) <b>Team-2</b>	<b>Practical</b> <b>Physio lab:</b> cerebellar Functions (1-500) <b>Team-2</b> <b>Histo lab:</b> cerebellum (51-100) <b>Team-1</b>	<b>LGIS</b> Limbic System <b>Dr. Asad/ Dr. Sarmad</b>	Islamic Studies  Pak. Studies
			<b>Tea Break</b>		
10.30 – 12:30	<b>LGIS</b> Extrathalamic modulatory pathways to cerebral cortex <b>Dr. Ijaz Anwar</b>  <b>SGD</b> Classification & connections of the thalamus <b>Team-1</b>	<b>SGD</b> Connections of hypothalamus <b>Team-1</b>	<b>LGIS</b> Neurotransmitters of the thalamus <b>Dr. Zahid Azeem</b>  <b>LGIS</b> Functions of the pineal gland <b>Dr. Fauzia</b>	<b>LGIS</b> Speech <b>Dr. Fauzia</b>  <b>LGIS</b> Functions of diencephalon <b>Prof. M. Ayub</b>	<b>SGD</b> Sleep <b>Team-1</b>
	<b>SDL</b>	<b>Wrap up</b> <b>Dr. Asad/Dr. sarmad</b>	<b>DSL</b> function of diencephalon	<b>SDL</b>	<b>Wrap up</b> <b>Dr. Ijaz Anwar</b>
	<b>Lunch &amp; Prayer Break</b>				
1.30-4PM	<b>Dissection</b> Thalamus <b>Team-1</b>	<b>Dissection</b> Hypothalamus <b>Team-1</b>	<b>Dissection</b> Pineal gland <b>Team-1</b>	<b>Dissection</b> Epithalamus & subthalamus <b>Team-1</b>	<b>SDL</b>



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Week-5

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b>SGD</b> Function & connections of diencephalon <b>Team-2</b> <b>Wrap-up</b> <b>Dr Ijaz Anwar</b>	<b>Practical</b> <b>Histo lab:</b> cerebellum (1-50) <b>Team-1</b> <b>Physio lab:</b> cerebellar Functions (51-100) <b>Team-2</b>	<b>Practical</b> <b>Physio lab:</b> cerebellar Functions (1-500) <b>Team-2</b> <b>Histo lab:</b> cerebellum (51-100) <b>Team-1</b>	<b>LGIS</b> Limbic System <b>Dr. Asad/ Dr. Sarmad</b>	Islamic Studies
					Pak. Studies
<b>Tea Break</b>					
10.30 – 12:30	<b>LGIS</b> Extrathalamic modulatory pathways to cerebral cortex <b>Dr. Ijaz Anwar</b>	<b>SGD</b> Connections of hypothalamus <b>Team-1</b>	<b>LGIS</b> Neurotransmitters of the thalamus <b>Dr. Zahid Azeem</b>	<b>LGIS</b> Speech <b>Dr. Fauzia</b>	<b>SGD</b> Sleep <b>Team-1</b>
	<b>SGD</b> Classification & connections of the thalamus <b>Team-1</b>		<b>LGIS</b> Functions of the pineal gland <b>Dr. Fauzia</b>	<b>LGIS</b> Functions of diencephalon <b>Prof. M. Ayub</b>	
	<b>SDL</b>	<b>Wrap up</b> <b>Dr. Asad/Dr. sarmad</b>	<b>DSL</b> function of diencephalon	<b>SDL</b>	<b>Wrap up</b> <b>Dr. Ijaz Anwar</b>
<b>Lunch &amp; Prayer Break</b>					
1.30-4PM	<b>Dissection</b> Thalamus <b>Team-1</b>	<b>Dissection</b> Hypothalamus <b>Team-1</b>	<b>Dissection</b> Pineal gland <b>Team-1</b>	<b>Dissection</b> Epithalamus & subthalamus <b>Team-1</b>	<b>SDL</b>

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Week-7

	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<b><u>LGIS</u></b> Functions of basal ganglia, Parkinsonism <b>Dr Ijaz Anwar</b>	Revision	<b>Written Assessment NEU Module</b>	<b>IPA-Block -3</b>	<b>SDL</b>
<b>Tea Break</b>					
10:30–12:30	<b><u>LGIS</u></b> Anatomical Review of Brain <b>Dr. Asad/Dr. Sarmad</b>	Revision	<b>SDL</b>	<b>IPA Block-3</b>	<b>SDL</b>
12:30 1:30	<b><u>LGIS</u></b> Physiological Reviews of Neurosciences <b>Prof. Ayub</b>				
<b>Lunch &amp; Prayer Break</b>					
2-4PM	<b><u>Dissection</u></b> <b>Team-1</b>	<b><u>Revision</u></b>	<b>SDL</b>	<b>IPA Block 3</b>	<b>SDL</b>



For Inquiries & Trouble Shooting, and Assistance please contact:

**Associate Dean**  
**Department of Medical Education**  
ayub@ajkmc.edu.pk, DME@ajkmc.edu.pk  
Tel: +92-5822-920527-8/808, 816